ABSTRACT

A method of calibrating bias drift with operating temperature over an operating temperature range for a vibrating structure gyroscope having a substantially planar, substantially ring shaped silicon vibrating structure (1), primary drive means (7) for putting and maintaining the vibrating structure (1) in carrier mode resonance, and secondary drive means (9) for nulling response mode motion of the vibrating structure is described. The secondary drive means (9) includes means to separate a detected response mode motion signal into a real component induced by applied rotation of the vibrating structure gyroscope and a quadrature component which is an error term indicative of error mismatch between carrier mode resonance frequency and response mode resonance frequency. The method includes the steps of measuring, over an operating temperature range of the vibrating structure gyroscope, primary drive means voltage P which is a measure of change in quality factor LQ of the vibrating structure with temperature, vibrating structure frequency f which is a measure of change of temperature of the vibrating structure, secondary drive quadrature component values S_q which is a measure of real component bias errors with temperature, and secondary drive real component values S_r which is a measure of change in bias, that is the zero inertial rate offset, of the vibrating structure gyroscope with temperature, substituting the values obtained in the relationship

$$S_r = \sum_k f^k \sum_l S_q^l \sum_m P^m a_{klm}$$

where a_{klm} are bias calibration coefficients for the vibrating structure gyroscope over the operating temperature range, and calculating from the relationship the coefficients a_{klm} to provide a set of bias calibration coefficients for the vibrating structure gyroscope over the tested operating temperature range.